In [2]:
```
import math as m
import numpy as np
```

In [25]:
```
def extended(a, b):
    x_0,y_0, x_1,y_1 = 0,1, 1,0
    while a != 0:
        q, r = b//a, b%a
        m, n = x_0-x_1*q, y_0-y_1*q
        b,a, x_0,y_0, x_1,y_1 = a,r, x_1,y_1, m,n
    gcd = b
    return gcd, x_0, y_0
#used article from brilliant to help write the function
```

In [26]:
```
extended(313608160045,1030168614988703)
```

Out[26]: (1, -466560018663026, 142032116757)

In [13]:
```
313608160045*(-466560018663026)+1030168614988703*142032116757
```

Out[13]: 1

In [14]:
```
x=1030168614988703-466560018663026
```

In [15]:
```
x
```

Out[15]: 563608596325677

In [16]:
```
(313608160045*563608596325677)%1030168614988703
```

Out[16]: 1

In [17]:
```
2228097317981-9620549844273
```

Out[17]: -7392452526292

In [18]:
```
egcd(313608160045,1030168614988703)
```

Out[18]: (1, -466560018663026, 142032116757)

In [19]:
```
-466560018663026+1030168614988703
```

Out[19]: 563608596325677

In [20]:
```
142032116757-313608160045
```

Out[20]: -171576043288

In [21]:
```
313608160045*563608596325677-171576043288*1030168614988703
```

Out[21]: 1

In [22]:
```
563608596325677*(-7392452526292)%1030168614988703
```

Out[22]: 343390387426778

In [23]:
```
(343390387426778*313608160045+9620549844273)%1030168614988703
```

Out[23]: 2228097317981

In [ ]: